

CLAIMS

1. An ROV system comprising:
 - a topside;
 - 5 a fish fitted with a GPS receiver;
 - a position data transmitter operable to transmit GPS position data; and
 - a position data receiver operable to receive GPS position data;
 - the position data transmitter and the position data receiver being further operable to relay GPS position data between the topside and the fish.
- 10 2. An ROV system according to claim 1, wherein:
 - the fish includes the position data transmitter, the position data transmitter being operable to transmit GPS position data obtained from the GPS receiver; and
 - the topside includes the position data receiver, the position data receiver being
 - 15 operable to receive the GPS position data transmitted from the fish.
3. An ROV system according to claim 1, wherein:
 - the topside is fitted with a GPS receiver, and includes the position data transmitter, the position data transmitter being operable to transmit GPS position data
 - 20 obtained from the topside GPS receiver; and
 - the fish includes the position data receiver, the position data receiver being operable to receive GPS position data transmitted from the topside.
4. An ROV system according to claim 1, wherein:
 - 25 the topside includes the position data transmitter, the position data transmitter being operable to transmit predetermined GPS position data; and
 - the fish includes the position data receiver, the position data receiver being operable to receive predetermined GPS position data from the topside.

5. An ROV system according to claim 1, wherein the fish has an onboard power supply.

6. An ROV system according to claim 1, wherein the fish comprises an upwardly protruding portion which houses the GPS receiver aerial.

7. An ROV system according to claim 1, further comprising an umbilical cable for interconnecting the fish and the topside, and having a communication path for relaying the GPS position data.

8. An ROV system according to claim 7, wherein the umbilical cable comprises a connector operable to detachably connect it to the fish, and which can be remotely operated by a detach command sent from the topside which causes the cable to detach from the fish.

9. An ROV system according to claim 8, and further comprising a tension sensor operable to measure tension in the umbilical cord and to cause a detach command to be sent to the connector if the tension exceeds a predetermined level.

10. An ROV system according to claim 1, wherein the GPS position data is transmitted via air.

11. An ROV system according to claim 2, wherein the topside further comprises a GPS receiver.

12. An ROV system according to claim 11, wherein the topside further comprises a second position data transmitter operable to transmit GPS position data obtained from the GPS receiver on the topside from the topside to the fish, and the fish further

comprises a second position data receiver operable to receive GPS position data transmitted from the topside.

13. An ROV system according to claim 1, and further comprising a movement
5 control device operable to process GPS position data and control movement of the fish in response to results of the processing.

14. An ROV system according to claim 13, wherein the movement control device is located in the fish.

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15. An ROV system according to claim 13, wherein the movement control device is located in the topside.

16. An ROV system according to claim 13, wherein the movement control device
15 is operable to process GPS position data obtained from the GPS receiver on the fish during earlier movements and control subsequent movement of the fish in response to results of the processing.

17. An ROV system according to claim 4, wherein the topside comprises a GPS
20 position data input device for user input of predetermined GPS position data.

18. An ROV system according to claim 17, and further comprising a movement
control device operable to process the predetermined GPS position data and GPS
position data obtained from the GPS receiver, and control movement of the fish in
25 response to results of the processing.

19. An ROV system according to claim 1, wherein the fish further comprises a buoyancy control device operable to automatically surface the fish from a depth of water in response to one or more predetermined conditions.

20. An ROV system according to claim 7, wherein the fish further comprises a buoyancy control device operable to automatically surface the fish from a depth of water in response to one or more predetermined conditions including one or more of:
5 severance of the umbilical cable; detachment of the umbilical cable from the fish; failure of a power supply operable to power the fish; and failure of thrusters operable to propel the fish.

21. An ROV system according to claim 19, wherein the fish includes the position
10 data transmitter, and the buoyancy control device is further operable to activate the GPS receiver and the position data transmitter when the fish surfaces.

22. An ROV system according to claim 21, wherein the fish further comprises a movement control device operable to process GPS position data obtained from the
15 activated GPS receiver and control movement of the fish in response to the results of the processing so as to propel the fish toward the topside.

23. An ROV system according to claim 22 wherein the movement control device is further operable to process GPS position data received from a GPS receiver on the
20 topside.

24. An ROV system according to claim 1, and further comprising an inertial navigation system on the fish operable to monitor movement of the fish and calculate its position relative to a starting position.
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25. A method of recovering a fish associated with an ROV system, comprising:
surfacing the fish from a depth of water;
activating a GPS receiver on the fish to obtain first GPS position data relating to the absolute position of the fish;

activating a GPS receiver on a topside to obtain second GPS position data relating to the absolute position of the topside;

comparing the first and second GPS position data to determine the relative position of the fish and the topside;

5 providing third GPS position data relating to the relative position to a movement control device operable to control propulsion of the fish; and

controlling propulsion of the fish in response to the third GPS position data to bring the fish adjacent to the topside.

10 26. A method according to claim 25, wherein the fish is automatically surfaced from a depth of water in response to severance or detachment of an umbilical cable interconnecting the fish and the topside.

15 27. A method according to claim 25, wherein the comparison of the first and second GPS position data comprises sending GPS position data between the fish and the topside by radio frequency communication.

26. A method of navigating a fish associated with an ROV system, comprising:
determining a route along which the fish will navigate;
20 determining a plurality of GPS position data, each datum corresponding to a location on the route;
providing the GPS position data to a topside of the ROV system;
transmitting the GPS position data from the topside to the fish; and
activating a movement control device on the fish operable to propel the fish
25 from location to location in response to the GPS position data and periodic measurements of actual fish location obtained from a GPS receiver on the fish.

27. A method of navigating a fish associated with an ROV system, comprising:
providing the fish with an inertial navigation system and a GPS receiver;

propelling the fish underwater from a starting position;

monitoring movement of the fish with the inertial navigation system to calculate its position relative to the starting position;

periodically surfacing the fish and activating the GPS receiver to obtain a
5 measurement of absolute position of the fish;

comparing the measured absolute position and the calculated relative position to determine any error in the calculated relative position; and

correcting the calculated relative position to correspond to the measured absolute position if an error is found.